

REMARKS

Claims 1-19 are pending in the above application. Claims 1-7 and 9 stand rejected under 35 U.S.C. §103 as being unpatentable over Catalano, U.S. Patent No. 4,671,614. Claim 8 stands rejected under 35 U.S.C. §103 as being unpatentable over Catalano in view of Contini, U.S. Patent No. 4,603,250. Finally, claims 17 and 19 stand rejected under 35 U.S.C. §102 and claim 18 stand rejected under 35 U.S.C. §103, in view of Laughlin, U.S. Patent No. 4,129,780.

With regard to the drawing objections set forth in paragraph 2 of the Office Action, Applicants have submitted herewith one substitute sheet of formal drawings containing Figure 2B to correct the typographical error noted regarding the length of delay of the camera window in the pulse sequence 50. Specifically, the value has been changed from 200 ns to 100 ns to correspond with the related description in the specification. No new matter has been added.

Applicants have also amended the specification at paragraphs [0005] and [0019] to correctly identify the corresponding U.S. Patent number for the attorney docket number recited therein.

With regard to the rejections under 35 U.S.C. §102, Applicants submit that claims 17 and 19 are novel in view of Laughlin because the present claims and the prior art differ. In particular, each of claim 17 and 19 require that the receiver camera be activated to form a plurality of non-overlapping detection windows for receiving reflected light resulted from the activated light source which, the Laughlin reference does not teach. In other words, these claims relate to an embodiment wherein a single illuminating pulse train containing several thousand pulses, all having the same amplitude, are emitted from the light source. At the same time, the corresponding camera windows for detection purposes are delayed to detect objects further away, and increased in length to capture more reflected image signals. This variation of pulse number with the delay then provides a basis for an optimum image quality.

Specifically, objects which are further away will contribute many light pulses to the corresponding detection window, whereas objects nearer the system will contribute relatively fewer light pulses to the detection window. The resulting composite video image will then result in a substantially uniform image representation for all detected objects at all distances.

In contrast, the Laughlin reference makes use of overlapping detection windows to result in a larger number of reflected signals as the distance between the receiver and the target increases. This is set forth at column 4, lines 17-28 wherein Laughlin recites:

Briefly stated, the function of the time delay circuitry 36 is to control the gating of the receiver 40 such that as the range between the target 34 and the receiver 40 increases the gate delay of successive gate windows continues to increase as a function of time, but the rate of this increase, decreases as a function of time. This variable delay has the effect of causing successive range windows to have greater overlap at large distances so that the number of received reflected interrogating pulse signals received by receiver 40 increases as the distance between the receiver 40 and the target 34 increases.

(Emphasis added).

With respect to claim 18, Applicants submit that claim 18 is non-obvious for at least the same reasons set forth with respect to claims 17 and 19 with regard to the Laughlin reference. Specifically, claim 18 requires that the detection window scheme be non-overlapping, which the Laughlin reference does not disclose or suggest.

With regard to claims 1-7 and 9 being rejected under 35 U.S.C. §103, the Catalano reference relates to a viewing system wherein a cyclically-operated pulsed light source illuminates a scene and a shutter is operated synchronously with the light source for transmitting to a human observer light rays reflected from objects located at selected distance intervals away from the light source. The objects of the Catalano system are to provide an illumination-viewing system wherein only objects at pre-specified distance

intervals are viewed at any one instant, or undesired light reflections and glare are eliminated, or different pre-specified distance intervals can be selected and viewed, or objects within a pre-specified distance interval and an ambient low visibility atmosphere glare are contrasted for improved viewing. Importantly, the Catalano system is not directed toward the problem addressed by the present invention. That is, Catalano does not address imaging issues with respect to the relative "brightness" of objects illuminated at all desired distance intervals. In other words, Catalano does not disclose or suggest a near infrared light source wherein the light pulse intensity is increasing throughout the pulse train in a manner coordinated with the time delay between detection windows to result in a substantially constant reflected image signal regardless of the distance to the detected object as claimed in the present invention. In this regard, Applicants traverse the suggestion in the Office Action that Catalano discloses actively and adaptively modifying the intensity of the illumination pulses within a pulse train as claimed in the present invention. Rather, the Catalano reference at column 6, lines 24-31 merely suggests in conclusory fashion that virtually every illumination system variable may need modification or "attention/adjustment... to effect a working system." A "working system" within the context of the Catalano reference refers to the ability to illuminate an object at a pre-specified distance and/or reduce the amount of glare which would otherwise result from a non-pulsed illumination scheme. Because Catalano is not concerned with the uniformity of a resulting composite image of multiple objects at varying distances, Applicants submit that the passing reference to "attention/adjustment to...intensity of illuminating light, etc." would not suggest a ramped intensity of illuminating pulses within a pulse train as claimed in the present invention. Thus, for at least the foregoing reasons, Applicants submit that claims 1-9 are non-obvious in view of the Catalano reference because the reference, in proper context, does not disclose or suggest Applicants' claimed method of ramped illumination pulsed intensity to result in a uniform composite image of detected objects.

With regard to claims 10-16, the Laughlin reference, as noted above, does not disclose or suggest the use of non-overlapping detection windows for a pulsed illumination imaging system as claimed in the present invention. Again, the Laughlin reference makes use of overlapping detection windows for imaging distant objects. There is no suggestion in the Laughlin reference to increase the gain of these detection windows as well. Like the Catalano reference discussed above with respect to illumination intensity, the Laughlin reference fails to disclose or suggest adaptively adjusting the gain in the non-overlapping detecting windows to correspondingly increase with the time delay such that distant objects are perceived at the same brightness as nearby objects. Indeed, the Laughlin reference mentions increased gain for the detection device, but dismisses it as unworkable for near-range objects. Column 1, lines 54-65. Applicants therefore submit that one of skill in the art would not be motivated to combine Laughlin with Contini as suggested in the Office Action because the Laughlin reference teaches away from adaptively modifying the receiver gain.

In view of the foregoing amendments and remarks, Applicants submit that claims 1-19 are novel and non-obvious in view of the cited art. A Notice of Allowance indicating the same is therefore earnestly solicited. The Examiner is invited to telephone the Applicants' undersigned attorney at (248) 223-9500 if any unresolved matters remain.

Respectfully Submitted,

ARTZ & ARTZ P.C.



Robert P. Renke, Reg. No. 40,783
28333 Telegraph Road, Suite 250
Southfield, MI 48034
(248) 223-9500

Dated: November 6, 2003

NOV-06-2003 15:44

U.S.S.N. 09/683,838

ARTZ & ARTZ P.C.

- 2 -

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201-0919 (FGT 1592 PA)

In The Drawings:

Please substitute the one sheet of formal drawings submitted herewith containing Figure 2B in place of the originally-filed drawing sheet containing the same Figure.

FIG. 2B